

be, its spacious chambers, high water-falls, and free-flowing rivers. The flowing waters sometimes work also by abrasion; but there is usually little loose material to transport for the purpose of abrasion.

In a similar way limestone cliffs have been chiseled into ranges of turrets, and deep recesses and channels made for rivers through limestone strata.

The excavation of the lagoon basins of coral islands has been attributed erroneously to erosion by the carbonic acid of the sea water.

(d) Except for surface erosion, limestone consisting of pure calcite, free from iron sulphides, is a durable rock, whether uncrystalline or crystalline, as in the case of the Carrara marble, of which such marvelous structures as the Milan cathedral have been made. But a magnesian limestone or dolomite, when crystalline, is often easily destructible, because, as already stated, the porous rock is likely to contain disseminated calcite; and as this is more soluble than dolomite, percolating waters carry it off, leaving the rest in the state of sand—a bad condition for the marble temple that may be made of it. The presence of the calcite can be detected only by observing whether, at any exposure of a layer in the region of a quarry, it is turning to sand.

Polished limestone marble containing any chert or other hard mineral, if employed in out-door ornamentation or on monuments, is sure to weather rough and become unsightly, and the chert may be made to stand out in ragged points or knobs. Even the vertical movement of the atmosphere over polished marbles will in time take off or dim the polish.

(e) Since carbonic acid attacks feldspar as well as other minerals, this agency, and that of oxidation, leave scarcely any kind of rock safe against destruction. Those are safest that are free from iron sulphides, and especially those that are so fine-grained and compact that water cannot gain access. Hence, the method of testing rocks for porosity by ascertaining how much water they will absorb in 24 hours is excellent. Some slate rocks are very durable because of their fine grain and the absence of any soluble minerals. Some granites absorb little water, some very much; and the latter are easily destructible.

3. *Constructive effects.* — (a) *Calcareous deposits.* — The most familiar deposits of this kind are the stalactites and stalagmites of caverns, *dripstone* formations; so-called because made by the calcareous waters dropping from the roofs. The “Gibraltar rock” is stalagmite. Still more interesting are the travertine or tufa deposits of streams. Leaves, nuts, and stems are often petrified by calcareous waters.

The travertine of Tivoli, near Rome, constitutes a large deposit along the Anio, whose waters are there strongly calcareous. Along Gardiners River, in the region of the Yellowstone Park, thick limestone deposits have been made, as is well illustrated and described in the Reports of Hayden’s Geological Survey of the Territories. The calcareous waters, in descending the slopes of the hills, have made a series of parapets at different